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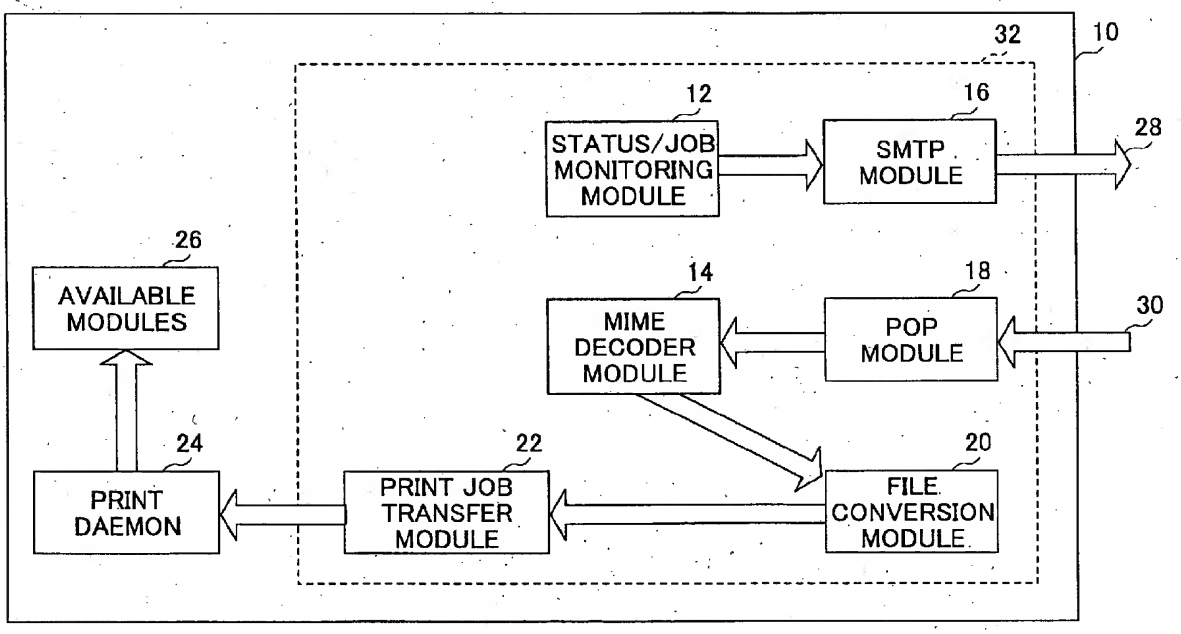
(54) Email based printer systems

(57) A printer system including a receiving module for receiving an electronic email including at least one attachment from an email server, a downloading module for downloading the attachment from the email server, and a converting module for converting the attachment from an application format into a printing data language (PDL) format. Also included is a printing module for printing the attachment converted into the PDL format.

FIG.4



EP 1 338 952 A2

Description

[0001] The present invention is related to printing systems, which can receive an electronic mail (email) including an attachment, convert the attachment from an application format into a printing data language format, and print the attachment.

[0002] Email is increasingly being used as an effective way of communicating. For example, it is possible to email someone a document or image by simply "attaching" the document or image to an email message. The user who receives the email may then open the attachment with the appropriate software application. That is, if the attachment was created with MICROSOFT WORD, the attachment will be opened using MICROSOFT WORD (note, if the proper software application is not available on the recipient's computer, a dialog will be displayed requesting the user to select another software application). Once the attachment is opened, the user may then print the file by using the print options associated with the software application.

[0003] However, to print the attachment, an appropriate printer driver must first be installed onto the computer. In more detail, Figure 1 illustrates a conventional set-up of a computer 52 and a printer 56 attached via a cable and/or other network 54. The printer 56 includes a connection port 57 for attaching the cable and/or other network 54 to the printer 56. Thus, a user using the computer 52 can select an item or other object to be printed on the printer 56.

[0004] Figure 2 illustrates a block diagram of a conventional application 60 interfacing the printer 56. The conventional application 60 is hosted on an operating system 64 resident on the computer 52. When the user invokes a print command from the application 60, the document or other item to be printed is communicated to a printer driver 62. The printer driver 62 is a printer and operating system specific software interface. The operating system 64 sends signals in accordance with instructions from the printer driver 62 to the printer port and/or network card 68 via a connection 66, thus placing signals corresponding to the document or other item to be printed on the cable and/or other network 54 connected to the printer 56.

[0005] However, a problem with this configuration is the computer 52 must have a printer driver 62 that specifically corresponds to the printer 56. This is problematic because a user may print an item on a printer which is at a completely different location than the user (i.e., via the Intemet/Intranet). That is, regardless of the user's location, the destination computer must still have the specific printer driver installed therein. Thus, the user must know the type of printer.

[0006] This results in the user having to continuously update the computer with the appropriate printer drivers. In addition, having several print drivers installed on a computer significantly decreases the amount of available memory.

[0007] Further, even if the proper printer driver is installed on the computer, it is very cumbersome to print several attachments included with the email. That is, the user must first open an attachment, print the attachment, close the attachment, open the next attachment and so on. This is extemely cumbersome, especially because there is no notification from the computer about whether or not a respective attachment was successfully printed. In addition, if one attachment is formed using MICROSOFT WORD and another attachment is a Portable Document Format (PDF) file, the computer must have both MICROSOFT WORD and ADOBE, for example, installed on the computer.

[0008] Additionally, there are currently available several small handheld computers which allow the user to receive emails while traveling, for example. The user in this instance may wish to print (while traveling) a file at his or her home or office location. However, to do this, the small handheld computer needs the appropriate printer driver as discussed above. This is particularly disadvantageous because the small handheld computer generally has less available memory than a general purpose computer.

[0009] Accordingly, one object of the present invention is to solve the above-noted and other problems.

[0010] Another object of the present invention is to provide a print system which can easily print electronic mail and associated attachments.

[0011] To achieve these and other objects, the present invention provides a novel printer including a receiving module for receiving an electronic email including at least one attachment from an email server, a downloading module for downloading the attachment from the email server, and a converting module for converting the attachment from an application format into a printing data language format. Further, the printer includes a printing module for printing the attachment converted into the printing data language format. In addition, in one example of the present invention, the printing module includes a print job transfer module for transferring the attachment as a print request to a print demon running on the printer. In this instance, the attachment is printed using a print interpreting module included with the printer. Thus, standard print software included with the printer does not have to be modified to interface with the receiving, downloading, converting and printing modules of the present invention, which may be installed either when the printer is manufactured or thereafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following derailed description when considered in connection with the accompanying drawings, wherein:

Figure 1 is an overview illustrating a conventional computer connected to a printer;

Figure 2 is a block diagram illustrating functional components and data passed between a software application and a printer;

Figure 3 is an overview illustrating a computer connected to a printer via the Intemet/Intranet;

Figure 4 is a block diagram of printer modules included with a printer according to a first example of the present invention;

Figure 5 illustrates a computer connected to a printer via the Internet/Intranet, and an associated application service provider;

Figure 6 is a block diagram of printer modules included with a printer according to a second example of the present invention; and

Figure 7 is a flowchart illustrating processes performed by the printer modules according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] According to the present invention, a user can send an email including an attachment directly to a printer so as to print the email and/or the attachment. Thus, the user's computer does not need specific printer drivers to convert the files into a print ready format. That is, a user may email a document, such as a WORDPERFECT document, as an email attachment directly to the printer so as to print the document.

[0014] Referring now to the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views, the present invention will be described. Figure 3 illustrates one example of the present invention, in which a computer 2 is connected to a printer 8 via the mtemet/Intranet 4 and a mail server 6. In this example, a user using the computer 2 may directly send an email including an attachment to the printer 8 via the Internet/Intranet 4 and mail server 6. The printer 8 then receives the electronic mail including the attachment, downloads the attachment from the email server 6, and converts the attachment from an application format into a printing data language format. The printer 8 then prints the attachment converted into the printing data language format.

[0015] Further, the printer 8 must be configured to have an email address. A new email account may be created for the printer 8 on the mail server 6 through conventional methods. The email account, password and mail server IP address information may then be stored in the printer using the menu system provided on the front panel of the printer, for example. Other possible ways of configuring the printer 8 to have an email address are through the embedded web server on the printer 8 or by telnetting the printer 8 to set the email address of the printer 8. Basically, an email address for the printer 8 is set in substantially the same fashion as an email address would be set up on a computer.

[0016] Turning now to Figure 4, which illustrates a block diagram of printer modules 10 included with the printer 8 according to the present invention. As shown, the printer modules 10 include additional modules 32, standard available modules 26 and a print daemon 24. The additional modules 32 may be installed on the printer already purchased or may be installed during the initial manufacture of the printer. Thus, the present invention is also applicable to printers that are already installed into existing networks. The standard available modules 26 include modules such as Postscript and PCL (Printer Control Language) modules.

[0017] As shown, the additional modules 32 include a status/job monitoring module 12, a Simple Mail Transfer Protocol (SMPT) module 16, a Post Office Protocol (POP) module 18, a Multipurpose Internet Mail Extension (MIME) module 14, a file conversion module 20, and print transfer module 22. The POP module 18 receives an electronic mail including at least one attachment from the email server 6 (see Fig. 3) via an input 30. That is, the POP module 18 operates in a continuous loop and awaits a print request sent from a user. Once the POP module 18 receives the request, the POP module 18 downloads the attachment from the email server 6. The MIME decoder module 14 then decodes the downloaded attachment from an email format (e.g., using multipurpose Internet mail extensions), and the file conversion module 20 converts the attachment from an application format into a printing data language (PDL) format.

[0018] The application format may be a document format, such as one created using known word processing applications including WORDPERFECT, MICROSOFT WORD, may be a spreadsheet format created using EXCEL, for example, or may be an image format including PDF files created using ADOBE ACROBAT, for example, or JPEG files. That is, the application format may be any format used to create the attachment. After the email and/or attachment(s) are converted into a printable language, the print job transfer module 22 transfers the email and/or the attachment(s) as a print request to a print daemon 24 running on the printer such that the email and/or attachment(s) are printed using a standard print interpreting module included with the available modules 26 of the printer. Thus, the additional modules 32 may be directly installed into a printer without having to modify the standard available modules 26.

[0019] Turning now to Figures 5 and 6, which illustrate another example of a printing system according to the present invention. In more detail, Figure 5 is similar to Figure 3, but illustrates a printer 34 associated with an application service provider 38 via the Internet 36. The printer 34 is similar to the printer 6 illustrated in Figure 3, but includes a Hyper Text Transfer Protocol Source (HTTPS) module 44 (see Figure 6), rather than the file conversion module 20 shown in Figure 4. Also included is a determine module 19 which determines whether or

not the email and/or attachments may be printed using a local file conversion module (such as the file conversion module 20 shown in Figure 4) or an outside server is required. The determine module 19 may be developed using a computer program language such as C++ and be configured to determine the application format of the email and/or attachment and to search the printer memory area (not shown) to determine whether or not the appropriate file conversion module exists on the printer.

[0020] If the determine module 19 determines the email and/or attachment(s) cannot be converted using an existing conversion module included in the printer modules 10, the determine module 19 instructs the HTTPS module 44 to establish a secure connection between the printer 34 and an application service provider (ASP) 38. The determine module 19 then uploads (transfers) the email and/or attachment(s) to the application service provider 38 via the internet (shown as arrow 38 in Figure 6). The application service provider 38 then converts the email and/or attachment(s) from the application format into a printing data language format. Next, the application service provider 38 downloads (transfers) the converted email and/or attachment(s) to the printer 34 as illustrated by the arrow 36 in Figure 6. Then, the same processes shown in Figure 4 are performed. That is, the print transfer module 22 transfers the converted email and/or attachment(s) to the print daemon 24 running on the printer 34 such that the email and/or attachment(s) are printed using a standard print interpreting module included in the available modules 26 of the printer 34.

[0021] In this second example of the present invention, the printer 34 does not need to contain several different file conversion modules (e.g., for converting WORDPERFECT files, JPEG files, PDF files, etc.), but rather may use an application service provider to perform this function. Therefore, available memory space on the printer 2 may be saved (i.e., it is not necessary to store several different file conversion modules).

[0022] In addition, in both Figures 4 arid 6, the printer modules 10 include the status/job monitoring module 12 and SMTP module 16. These modules are used to monitor a status of a print request, and to notify a user who sent the electronic email whether or not the print request was successful. Further, the status/job monitoring module 12 uses a Simple Mail Transfer Protocol (i.e., the SMTP module) to notify the user about whether or not the print job was successful.

[0023] Further, the SMTP, MIME, POP and HTTPS modules are standard protocol modules which are available as open source, Thus, the open source may be installed onto the printer hardware/software platform. The determine module 19 (shown in Figure 6) and print transfer module 22 (shown in Figures 4 and 6) may be developed using an appropriate software computer language C++, etc. as discussed above.

[0024] Turning now to Figure 7, which is a flowchart illustrating an overall process of the printer modules according to the present invention. In more detail, the POP module 10 receives an email including at least one attachment from an email server (step S2), and then downloads the email and/or attachment (step S4). The MIME module 14 decodes the attachment (step S6) and the determine module 19 determines in Step S8 whether or not the downloaded attachment(s) can be converted locally (i.e., with a file conversion module included in the printer). If it is determined the email and/or attachment (s) cannot be converted by a converting module included with the printer (No in step S8), the determine module 19 transfers the decoded email and/or attachment(s) using the HTTPS module 44 to/from an application service provider external to the printer for the necessary conversion (step S12). Alternatively, if the determine module 19 determines the decoded email and/or attachment can be converted using a file conversion module included with the printer (Yes in step S8), the decoded attachment is converted locally on the printer (step S10).

[0025] Then, in step S14, the print job transfer module 22 establishes a connection with the print demon 24 so as to print the email and/or attachment(s). The status/job monitoring module 12 and SMTP module 16 then notify the user about whether or not the print request was performed successfully (step S16).

[0026] Figures 4 and 6 illustrate the converted files being printed via the print daemon 24. However, it is also possible to transfer the converted files directly to the available modules 26 for printing. This requires modification of the additional modules 32 and available modules 26 so they may directly interface with each other modified so that they directly interface with the additional modules 32.

[0027] This invention may be conveniently implemented using a conventional general purpose digital computer or microprocessor programmed according to the teachings of the present specification, as will be apparent to those skilled in the computer art. Appropriate software coding can readily be prepared by skilled programmers based on the teachings of the present disclosure; as will be apparent to those skilled in the software art. The invention may also be implemented by the preparation of application specific integrated circuits whereby interconnecting an appropriate network of conventional computer circuits, as will be readily apparent to those skilled in the art.

[0028] Any portion of the present invention implemented on a general purpose digital computer or microprocessor includes a computer program product which is a storage medium including instructions which can be used to program a computer to perform a process of the invention. The storage medium can include, but is not limited to, any type of disk including floppy disk, optical disk, CD-ROMs, and magneto-optical disks, ROMs, RAMs, EPROMs, EEPROMs, magnetic or optical cards, or any type of media suitable for storing electronic instructions.

[0029] Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.

Claims

1. A printer, comprising:

   a receiving module configured to receive an electronic email including at least one attachment from an email server;
   a downloading module configured to convert the at least one attachment from the email server;
   a converting module configured to convert the at least one attachment from an application format into a printing data language format; and
   a printing module configured to print the at least one attachment converted into the printing data language format.

2. The printer according to claim 1, wherein the application format includes one of WORDPERFECT, MICROSOFT WORD, and EXCEL, and

   wherein the printer data language includes one of POSTSCRIPT, and Printer Control Language.

3. The printer according to claim 1 or 2, further comprising:

   a decoding module configured to decode the downloaded attachment.

4. The printer according to claim 1, 2 or 3, wherein the printing module comprises:

   a print job transfer module configured to transfer the at least one attachment as a print request to a print daemon running on the printer such that the at least one attachment is printed using a print interpreting module included with the printer.

5. The printer according to claim 1, 2, 3 or 4, wherein the printing module transfers the at least one attachment directly to a print interpreting module included with the printer to print the at least one attachment.

6. The printer according to claim 1, 2, 3, 4 or 5, further comprising:

   a determining module configured to determine whether or not the at least one attachment can be converted using the converting module of the printer.

7. The printer according to claim 6, wherein the converting module transfers the at least one attachment to/from an application service provider external to the printer so as to convert the at least one attachment into the printing data language format if the determining module determines the at least one attachment can not be converted by the converting module of the printer.

8. The printer according to claim 7, wherein the converting module uses a hyper text transfer secure protocol to transfer the at least one attachment to/from the application service provider external to the printer.

9. The printer according to any one of the preceding claims, further comprising:

   a status monitoring module configured to monitor a status of a print request corresponding to the at least one attachment included in the electronic email, and configured to notify a user who sent the electronic email whether or not the print request was successful.

10. The printer according to claim 9, wherein the status monitoring module uses a simple mail transfer protocol to notify the user about whether or not the print request was successful.

11. The printer according to claim 3, wherein the receiving and downloading modules use a post office protocol to receive and download the at least one attachment, and

    wherein the decoding module uses multipurpose Internet mail extensions to decode the downloaded attachment.

12. A method of printing, comprising:

    receiving, via a printer, an electronic email including at least one attachment form an email server;
    downloading, via the printer, the at least one attachment from the email server;
    converting, via the printer, the at least one attachment from an application format into a printing data language (PDL) format; and
    printing, via the printer, the at least one attachment converted into the PDL format.

13. The printing method- according to claim 12, wherein the application format includes one of WORDPERFECT, MICROSOFT WORD, and EXCEL, and

    wherein the PDL includes one of POST-

SCRIPT, and Printer Control Language.

14. The printing method according to claim 12 or 13, further comprising:

decoding, via the printer, the downloaded attachment.

15. The printing system according to claim 12, 13 or 14, wherein the printing step comprises:

transferring, via the printer, the at least one attachment as a print request to a print daemon running on the printer such that the at least one attachment is printed using a print interpreting module included with the printer.

16. The printing method according to any one of claims 12 to 15, wherein the printing step transfers the at least one attachment directly to a print interpreting module included with the printer to print the at least one attachment.

17. The printing method according to any one of claims 12 to 16, further comprising:

determining, via the printer, whether or not the at least one attachment can be converted by the converting step.

18. The printing method according to claim 17, wherein the converting step transfers the at least one attachment to/from an application service provider external to the printer so as to convert the at least one attachment into the printing data language format if the determining step determines the at least one attachment can not be converted by the converting step.

19. The printing method according to claim 18, wherein the converting setp uses a hyper text transfer secure protocol to transfer the at least one attachment to/from the application service provider external to the printer.

20. The printing method according to any one of claims 12 to 19, further comprising:

monitoring, via the printer, a status of a print request corresponding to the at least one attachment included in the electronic email, and notifying a user who sent the electronic email whether or not the print request was successful.

21. The printing method according to claim 20, wherein the monitoring step uses a simple mail transfer protocol to notify the user about whether or not the print request was successful.

22. The printing method according to claim 14, wherein the receiving and downloading steps use a post office protocol to receive and download the at least one attachment, and

wherein the decoding step uses multipurpose Internet mail extensions to decode the downloaded attachment.

23. A computer program comprising code means that, when executed on a printer, instruct the printer to perform the method of any one of claims 11 to 22.

FIG.1 PRIOR ART

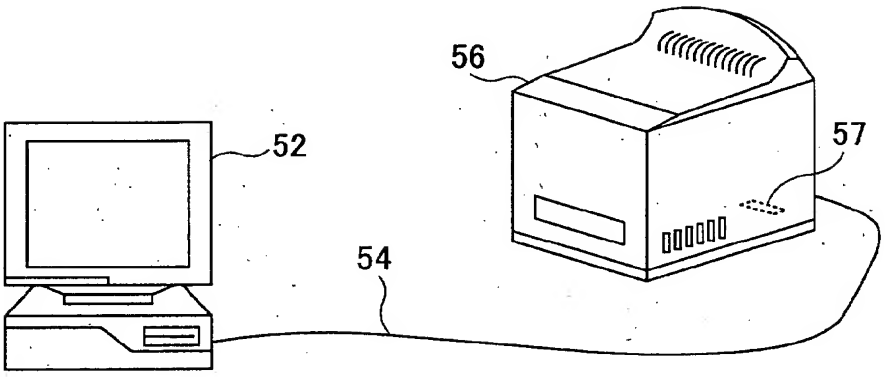


FIG.2 PRIOR ART

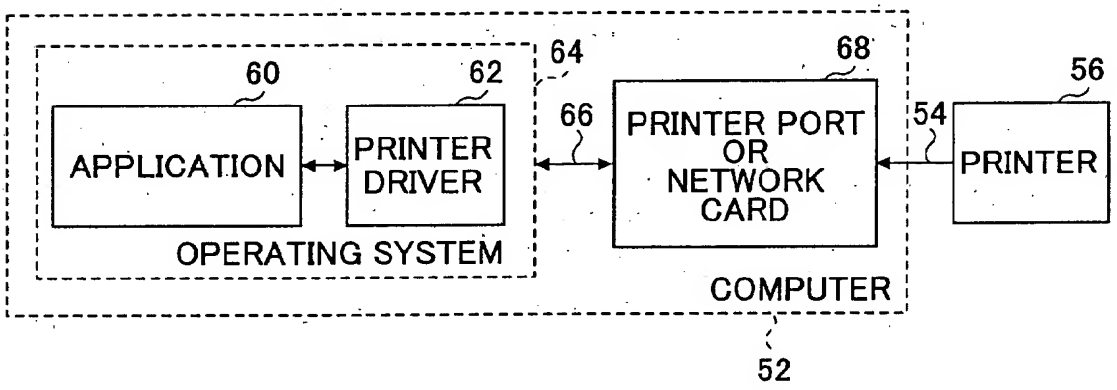


FIG.3

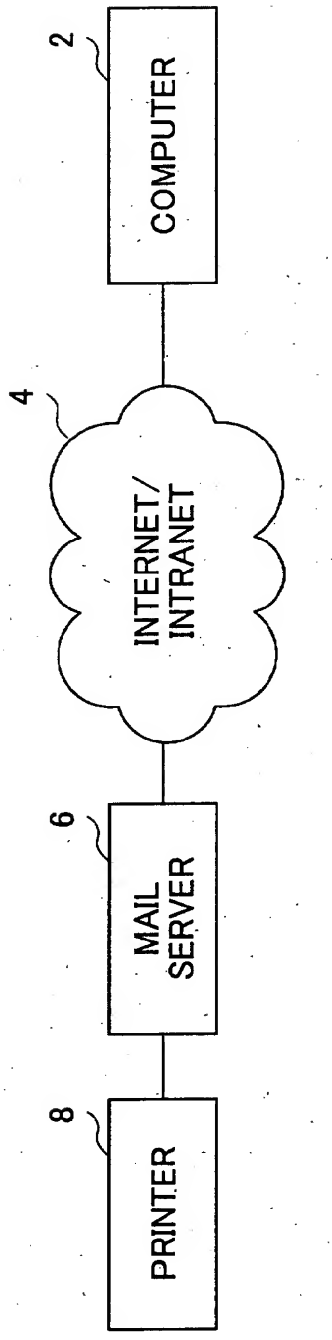


FIG.4

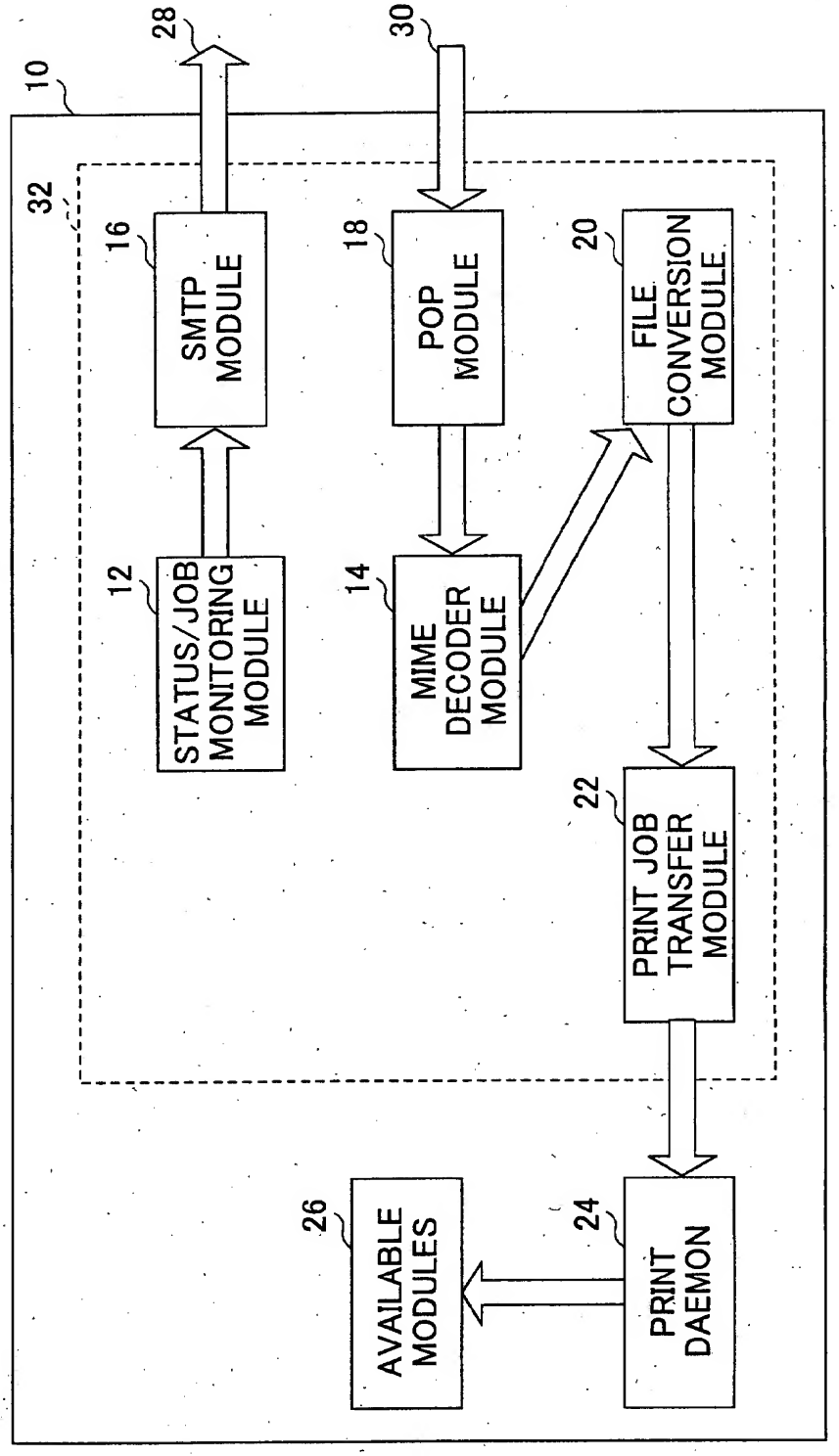

10
28
30
32
16
SMTP MODULE
18
POP MODULE
20
FILE CONVERSION MODULE
12
STATUS/JOB MONITORING MODULE
14
MIME DECODER MODULE
22
PRINT JOB TRANSFER MODULE
26
AVAILABLE MODULES
24
PRINT DAEMON

FIG.5

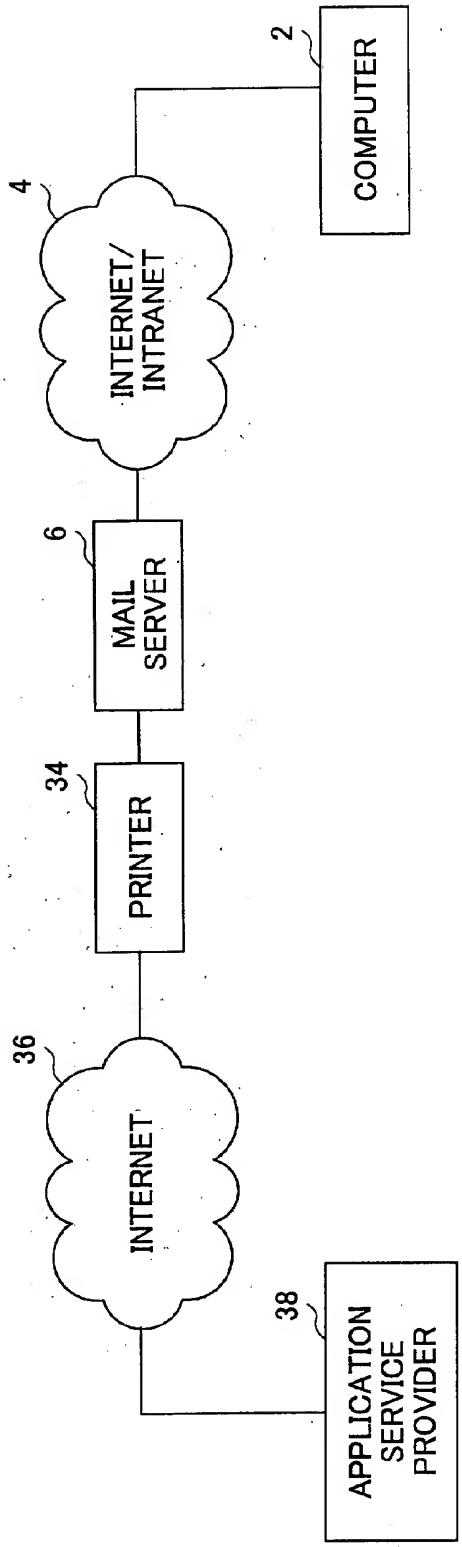

2
COMPUTER
4
INTERNET/
INTRANET
6
MAIL
SERVER
34
PRINTER
36
INTERNET
38
APPLICATION
SERVICE
PROVIDER

FIG.6

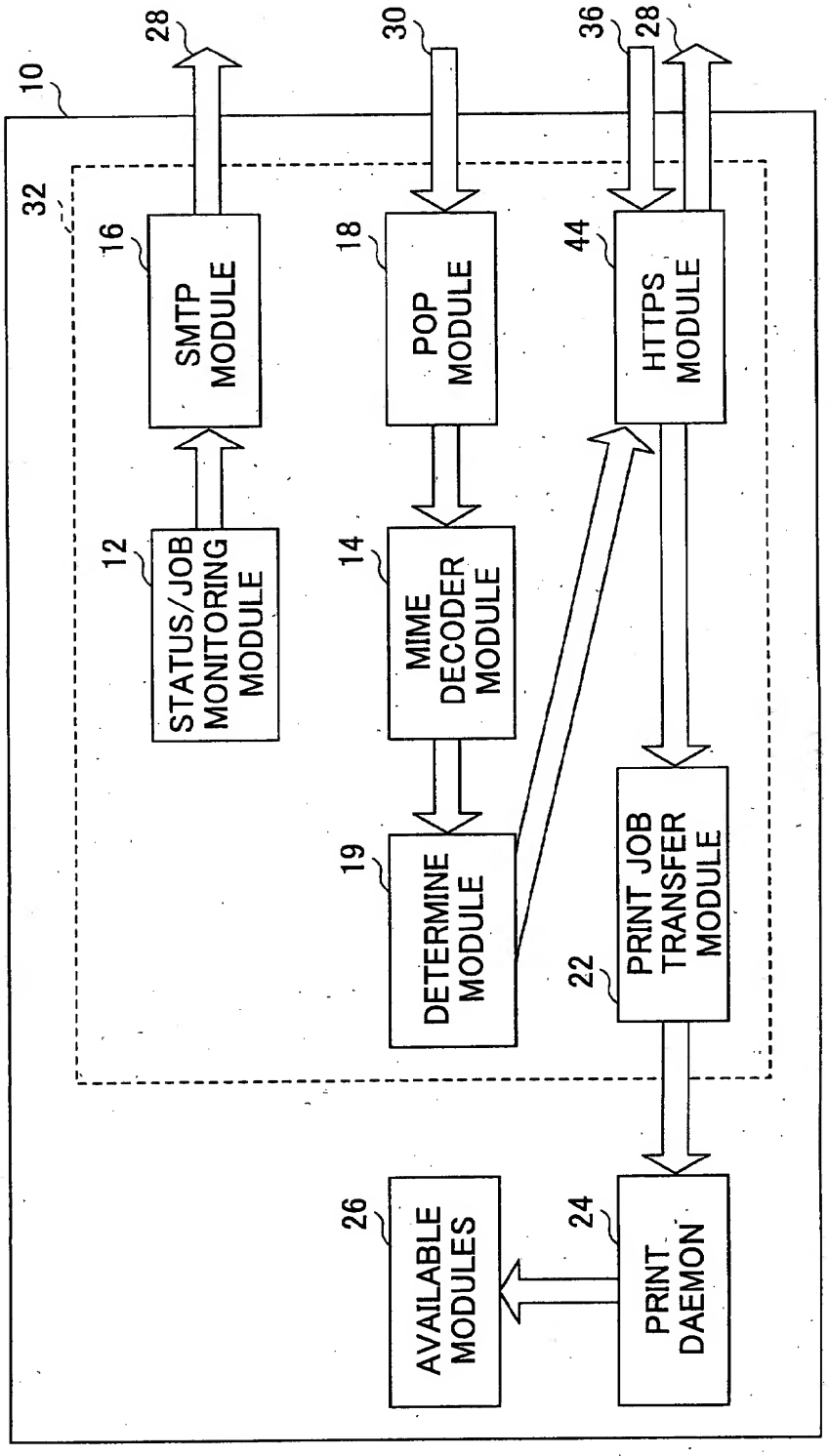
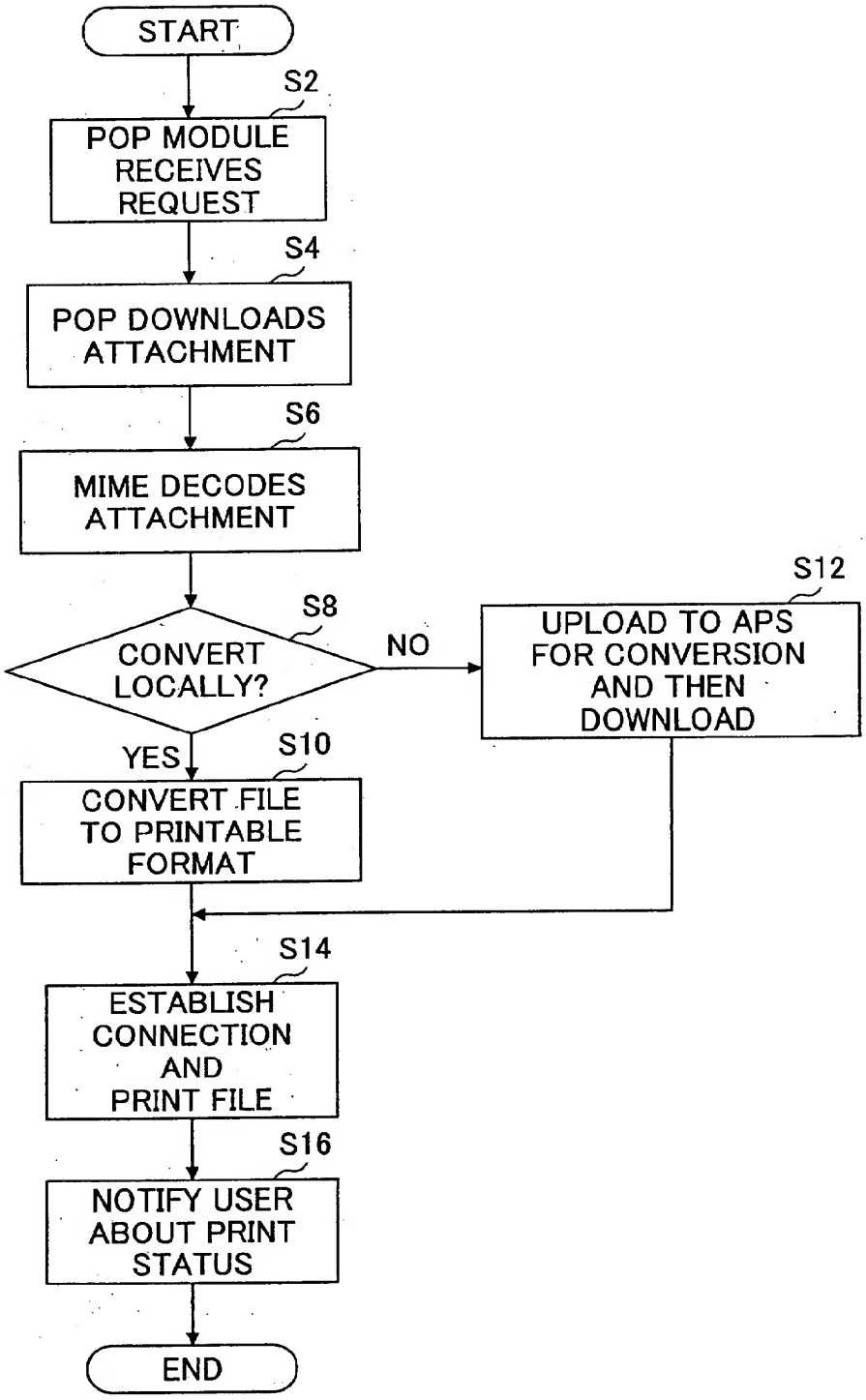

10
28
30
36
28
32
16
SMTP MODULE
18
POP MODULE
44
HTTPS MODULE
12
STATUS/JOB MONITORING MODULE
14
MIME DECODER MODULE
19
DETERMINE MODULE
22
PRINT JOB TRANSFER MODULE
26
AVAILABLE MODULES
24
PRINT DAEMON

FIG.7


START
S2
POP MODULE RECEIVES REQUEST
S4
POP DOWNLOADS ATTACHMENT
S6
MIME DECODES ATTACHMENT
S8
CONVERT LOCALLY?
NO
S12
UPLOAD TO APS FOR CONVERSION AND THEN DOWNLOAD
YES
S10
CONVERT FILE TO PRINTABLE FORMAT
S14
ESTABLISH CONNECTION AND PRINT FILE
S16
NOTIFY USER ABOUT PRINT STATUS
END